

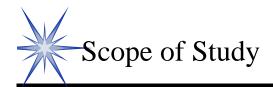
Supply And Cost Of Alternatives To MTBE In Gasoline

March 1, 1999

California Energy Commission



- Legislative Mandate
 - ➤ May 12, 1997 hearing
 - ➤ Minimum 15 to 40 percent production decline
 - ➤ Line item in state budget
- Focus Of Commission's Report
 - ➤ Potential impacts on supply and cost of gasoline if MTBE phased out
 - ➤ Impacts of different transition time periods



- MTBE Completely Displaced With An Alternative Oxygenate
 - ➤ ethanol, ETBE, TBA and TAME
- Gasoline Produced Without Any Oxygenates
- Federal Requirement For Minimum Oxygen Content Removed - MTBE Use Reduced



Study Design - Transition Time Periods

- Near Term Immediate Phase Out
 - ➤ Limiting factors identified
- Intermediate Term (3 Years)
 - ➤ Minor refinery modifications
 - ➤ Oxygenate capacity expanded or converted
- Long Term (6 Years)
 - ➤ Major refinery modifications
 - ➤ New oxygenate capacity constructed



- Immediate Phase Out Would Be Drastic With Catastrophic Impact On Consumers
- Phase Out Over Three Years Costly But Feasible
- Phase Out Over Six Years Is Lowest Cost



Key Findings - Ethanol

- Intermediate Term
 - ➤ Increase costs 6.1 to 6.7 cents per gallon
 - ➤ 75,000 barrels per day of ethanol
 - ➤ Up to 142,000 barrels per day of additional gasoline imports
- Long Term
 - ➤ Increase costs 1.9 to 2.5 cents per gallon
 - ➤ 79,000 barrels per day of ethanol
 - ➤ Up to 113,000 barrels per day of additional gasoline imports



Key Findings - Ethanol With One Pound Volatility Waiver

- Intermediate Term
 - ➤ Increase costs 4.0 to 5.4 cents per gallon
 - ➤ 97,000 barrels per day of ethanol
 - ➤ Up to 38,000 barrels per day of additional gasoline imports
- Long Term
 - ➤ Range from a cost decrease of 0.8 cents to an increase of 1.0 cents per gallon
 - ➤ 103,000 barrels per day of ethanol
 - ➤ Up to 28,000 barrels per day of additional gasoline imports



Key Findings - ETBE

- Intermediate Term
 - ➤ Increase costs 2.4 to 2.5 cents per gallon
 - ➤ 129,000 barrels per day of ETBE
 - ➤ No additional gasoline imports required
- Long Term
 - ➤ No change in cost
 - ➤ 137,000 barrels per day of ETBE
 - ➤ No additional gasoline imports required



Intermediate Term

- ➤ Increase costs 0.5 to 1.4 cents per gallon
- ➤ Up to 89,000 barrels per day of TBA
- ➤ Up to 22,000 barrels per day of additional gasoline imports

• Long Term

- ➤ Increase costs 0.3 to 1.0 cents per gallon
- ➤ Up to 104,000 barrels per day of TBA
- ➤ Up to 19,000 barrels per day of additional gasoline imports



Key Findings - Mixed Oxygenates

Intermediate Term

- ➤ Range from a cost decrease of 0.2 cents to an increase of 0.2 cents per gallon
- ➤ Up to 101,000 barrels per day of ETBE & TBA
- ➤ No additional gasoline imports required

• Long Term

- ➤ Decrease costs 0.3 to 0.4 cents per gallon
- ➤ 126,000 barrels per day of ETBE & TBA
- ➤ No additional gasoline imports required



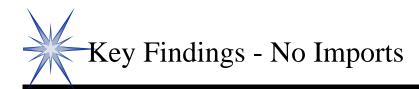
Key Findings - Reduced Use Of MTBE (HR 630)

- Intermediate Term
 - ➤ Decrease costs 0.2 to 0.8 cents per gallon
 - ➤ MTBE use declines by as much as 31 percent
 - ➤ No additional gasoline imports required
- Long Term
 - ➤ Decrease costs 0.3 to 1.5 cents per gallon
 - ➤ MTBE use declines by as much as 21 percent
 - ➤ No additional gasoline imports required

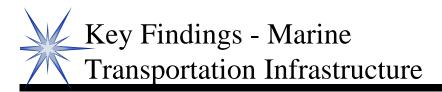


Key Findings - No Oxygenates

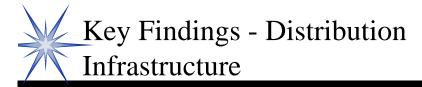
- Intermediate Term
 - ➤ Increase costs 4.3 to 8.8 cents per gallon
 - ➤ Up to 355,000 barrels per day of additional gasoline imports
- Long Term
 - ➤ Increase costs 0.9 to 3.7 cents per gallon
 - ➤ Up to 140,000 barrels per day of additional gasoline imports



- Long Term Impacts on Ethanol Cases
 - ➤ Increase costs by an additional 0.2 cents per gallon
 - ➤ Additional \$1.2 billion for refinery investments
- Long Term Impacts on No Oxygenate Cases
 - ➤ Increase costs by an additional 0.6 cents per gallon
 - ➤ Additional \$1.4 billion for refinery investments



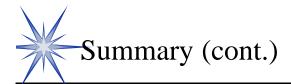
- Marine Terminals
 - ➤ Sufficient capacity to handle additional imports and exports without modifications
 - ➤ One exception no oxygenates case for intermediate term
- Marine Vessels
 - ➤ Adequate supply of foreign vessels
 - ➤ Availability of Jones Act tankers a concern



- Distribution Terminals
 - ➤ No modifications necessary for most alternative oxygenates
- Modifications Required To Use Ethanol
 - ➤ Would have to be blended at the terminals
 - ➤ Cost \$60 million or about 0.1 cents per gallon
 - ➤ Construction would require up to 2 years to complete



- Immediate Phase Out Of MTBE, Without Suspension Of State And Federal Regulations, Would Be Infeasible
- Intermediate Phase Out
 - ➤ Could cost up to 6.7 cents per gallon
 - ➤ Cost up to 8.8 cents per gallon if all oxygenates phased out



- Long Term Phase Out
 - ➤ Least costly, savings in some cases
 - ➤ Cost up to 3.7 cents per gallon if all oxygenates phased out
- Removal Of Minimum Oxygen
 Requirement Beneficial In All Cases And Any Time Period